

## REMARKS

Applicant thanks the Examiner for the prompt Office Action dated December 22, 2010. Claims 14, 15, 19 and 20 have been amended to overcome the cited prior art. Claims 1-3, 17 and 22 have been previously cancelled. Claim 18 has been amended to depend from claim 14 to overcome the rejection under 35 U.S.C. §112. Claims 24-27 have been withdrawn, and are so marked in response to the Examiner's objection.

### Response to Rejections Under 35 U.S.C. §102(b) and 103(a)

Independent claims 14 and 19 stand rejected under 35 U.S.C. §102(b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Sommer. Claims 14-16 and 19-21 stand rejected as obvious over Czech ('238). Claims 14-16 and 19-21 stand rejected as obvious over Czech ('712). Claims 14-16, 18-21 and 23 stand rejected as obvious over WO '527. Claims 14-16, 18-21 and 23 stand rejected as obvious over EP '454. Claims 14-16, 18-21 and 23 stand rejected as obvious over Czech ('238) in view of Sommer, and also stand rejected as obvious over Czech ('712) in view of Sommer. In addition, claims 14-16, 18-21 and 23 stand rejected as obvious over WO '527 in view of Sommer; and, claims 14-16, 18-21 and 23 stand rejected as obvious over EP '454 in view of Sommer.

In response to each of these rejections, Applicant has amended claims 14 and 19 to include a limitation that is not disclosed in any of the cited references including Sommer, which the Examiner states anticipates claims 14 and 19. More specifically, claims 14 and 19 have been amended to include the limitation to, "...the concentration of cobalt, relative to the concentration of the other elements in the alloy, suppresses a  $\gamma$  phase of the alloy thereby avoiding a peak in a coefficient of thermal expansion of the alloy."

The Examiner's attention is directed to paragraphs 31-35 of the subject application:

[00031] It should be noted that the levels of the individual elements are specifically adapted with a view to their actions as seen in conjunction with the element rhenium. If the levels are such that no chromium-rhenium precipitates are formed, brittle phases are advantageously not formed while the protective layer is in use, so that the service life is improved and lengthened.

[00032] This is achieved not only by a low chromium content but also, taking into account the influence of aluminum on the phase formation, by accurately setting the aluminum content.

[00033] **Selecting 24 to 26% cobalt surprisingly significantly and disproportionately improves the thermal and mechanical properties of the protective layer 7.**

[00034] **With this narrowly selected range of cobalt, the initial and further formation of the  $\gamma$  phase of the alloy**, which normally leads to a peak in the coefficient of thermal expansion of the alloy, is particularly successfully suppressed. Otherwise, when the component having the protective layer 7 is heated up (i.e. when the turbine is started up), or in the vent of other temperature fluctuations, this peak would cause high mechanical stresses (thermal mismatch) between protective layer 7 and substrate 4.

[00035] This is at least drastically reduced by the cobalt content which has been selected in accordance with the invention. (emphasis added).

Thus, Applicant has found that this narrow percentage range of cobalt relative to the other components, including rhenium, **surprisingly, significantly and disproportionately** improves the thermal and mechanical properties of the claimed protective layer. Similarly, the percent by weight of rhenium claimed is only 0.5 % to 2% which is a comparatively narrower range than the 1% to 8% disclosed in Sommer. As provided in the specification above, the levels of individual elements are specifically adapted in view of their actions with rhenium to avoid forming brittle phases that may be caused by chromium-rhenium precipitates.

Not one of the references, including, but not limited to, Sommer, cited by the Examiner, discloses the claimed concentration range of cobalt in combination with the other elements of the alloy. Indeed, Sommer appears to teach away from the suppression of the  $\gamma$  phase of the alloy by teaching that the  $\gamma$  phase is promoted. The Examiner's attention is directed to col. 2, lines 54-61 of Sommer, which provides:

The alloy simultaneously provides optimum oxidation and corrosion resistance, phase stability during diffusion heat treatment and during service, and excellent mechanical behavior, especially high ductility, high creep resistance, and thermal expansion similar to the substrate.

This is achieved by a specific phase structure consisting of  $\beta$ -reservoir phase precipitates (45-69 vol%) in a ductile  $\gamma$ -matrix (40-50 vol%). (emphasis added)

Sommer also provides that the stable phase structure of the preferred compositions (45-60 vol.%  $\beta$  and 55-40 vol.%  $\gamma$ ) is found to result in extremely high mechanical properties of coated specimens or components. Sommer, col. 4, lines 29-32.

Thus, Sommer discloses the promotion of the  $\gamma$  phase of the alloy instead of suppressing this stage. As discussed above, the claimed concentration of cobalt in combination with the concentrations of the other elements suppresses the  $\gamma$  phase to avoid a peak in the coefficient of thermal expansion of the alloy. Moreover, not one of the other cited references discloses or even suggests this claimed limitation. Applicant submits that it would not have been obvious to one skilled in the art that the claimed narrow concentration range of cobalt would result in the suppression of the  $\gamma$  phase of the alloy as claimed.


Applicant notes further that claims 14 and 19 have been amended so that the claimed alloy comprises 16 to 18 % of chromium (% by weight). This concentration range of chromium is outside the concentration range of chromium disclosed by Sommer; therefore, Sommer cannot anticipate claims 14 and 19.

Conclusion:

For the foregoing reasons, it is respectfully submitted that the rejections set forth in the outstanding Office Action are inapplicable to the present claims. All correspondence should continue to be directed to our below-listed address. Accordingly, Applicant respectfully requests that the Examiner reconsider the rejections and timely pass the application to allowance. Please grant any extensions of time required to enter this paper. The commissioner is hereby authorized to charge any appropriate fees due in connection with this paper, including fees for additional claims and terminal disclaimer fee, or credit any overpayments to Deposit Account No. 19-2179.

Respectfully submitted,

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By: 

Ye Ren  
Registration No. 62,344  
(407) 736-6844

Siemens Corporation  
Intellectual Property Department  
170 Wood Avenue South  
Iselin, New Jersey 08830